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avives@eresmas.net

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Patocka, J.; Turcáni, M.

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Contribution to the description of pupae of several Western Palaearctic noctuids to further clarify their position within the Erebidae (Lepidoptera: Erebidae, Catocalinae)

J. Patočka (†) & M. Turčáni

Abstract

The descriptions of pupae of five Western Palaearctic species of Erebidae representing three genera in the subfamily Catocalinae are provided, namely: *Catocala oberthuri* (Austauf, 1869); *Catocala disjuncta* (Geyer, [1828]); *Catocala eutychea* (Treitschke, 1835); *Grammodes stolidi* (Fabricius, 1775); and *Drasteria cailino* (Lefebvre, 1827). In addition to the descriptions, the main morphological characters of pupae are illustrated and brief information given about the distribution of the species and food plants of their larvae. The main characteristics found on pupae are compared with those of related noctuid moth species and differences are discussed. The systematic status and position of described species in current systems is also discussed in relation to the morphology of their pupae.

KEY WORDS: Lepidoptera, Erebidae, Catocalinae, pupae, comparative morphology, taxonomy, Western Palaearctic region.

Contribución a la descripción de la pupa de algunos noctuidos del oeste Paleártico con clarificaciones adicionales de su posición dentro de los Erebidae (Lepidoptera: Erebidae, Catocalinae)

Resumen

Se propone la descripción de la pupa de cinco especies de Erebidae de la región Paleártica occidental representando tres géneros en la subfamilia Catocalinae, véase: *Catocala oberthuri* (Austauf, 1869); *Catocala disjuncta* (Geyer, [1828]); *Catocala eutychea* (Treitschke, 1835); *Grammodes stolidi* (Fabricius, 1775) y *Drasteria cailino* (Lefebvre, 1827). En adición a las descripciones, se ilustran los caracteres morfológicos de las pupas y se da una breve información sobre la distribución de las especies y la planta nutricia de las larvas. Se comparan y discuten, las principales características encontradas de las pupas y se comparan con las especies próximas de noctuidos. Se discute el estatus y la posición sistemática de las especies descritas, en relación con la morfología de sus pupas.

PALABRAS CLAVE: Lepidoptera, Erebidae, Catocalinae, pupas, morfología comparativa, taxonomía, región Paleártica occidental.

Introduction

This contribution is a continuation of the previous work of PATOČKA (1995) and PATOČKA & TURČÁNI (2005). The taxonomic position of some noctuid / erebid species is still not clear and various authors, e.g. BECK (2000) vs. FIBIGER & SKULE (2011) place the same species in different families, subfamilies, tribes or genera. Since the pupal stage of Lepidoptera is not covered by hairs and/or scales,

it is relatively easy to find many characteristics which may be used for both identification and classification (PATOČKA & TURČÁNI, 2005). Our objective in this paper is to describe the external morphology of pupae of species which have not been described previously and to apply our results to further clarify the taxonomic position of species/genera within the family Erebidae. It is difficult to propose changes in the currently used system on the basis of the pupal stage only since species described here originate from a single zoogeographical region. Other related species from different areas of origin may have different morphological characters. Thus, we also offer suggestions and provide recommendations for taxonomists to consider in the future placement of Noctuid / Erebid species.

Material and methods

Pupal material was loaned from the National Museum of Natural History in Leiden (NATURALIS, The Netherlands), the Zoological Museum in Amsterdam (ZMA, The Netherlands). Additional material originates from the collection of the senior author. The methodology used is the same as described in PATOČKA (1996) and PATOČKA & TURČÁNI (2005).

Results

Subfamily Catocalinae

Genus *Catocala* SCHRANK, 1802

Pupae of this genus are described in PATOČKA (1995) and may be identified using the key to the genera of the family Noctuidae in PATOČKA & TURČÁNI (2005). An additional three Western Palaearctic species are described in this paper.

Catocala oberthuri (Austauf, 1869) (Figs 1-10)

Material examined: Spain, 1 male exuvia, coll. NATURALIS Leiden.

For identification of this genus using the key to the species of the genus *Catocala* in PATOČKA & TURČÁNI (2005), refer to couplet #2. The pupa of *C. oberthuri* differs from the pupa of *C. fraxini* (Linnaeus, 1758) based on the size and shape of the labrum. The labrum has regularly domed sides and is rounded caudally, almost semi-circular (Fig. 2), whereas *C. fraxini* and also *C. elocata* (Esper, 1787) have a trapezium-like labrum.

This species is the most similar to *C. nupta* (Linnaeus, 1767), however it is larger and its cremaster has a different contour in both ventral and dorsal views. Its sides are uniformly domed up to the end (Figs 8, 10), whereas in *C. nupta*, the sides are almost straight and angularly refracted. The cremaster has longitudinal ribbing on most of the ventral side (Fig. 8); *C. nupta* has reticular ribbing. *C. elocata* and *C. electa* (Vieweg, 1790) have conspicuous tubercles on the base of the ventral side of the cremaster; these are poorly developed on the pupa of *C. oberthuri* (Figs 8, 9).

Description of pupa: 33 x 10.5 mm in size, medium stout, red-brown, with only weak white wax dusting. Sculpture (except of cremaster and its vicinity) medium fine, locally medium scabrous, wrinkled. Puncturation present on abdominal segments 1-7, stronger and more dense on the base of segments 5-7. Setae are small. Labrum rounded regularly caudad, almost semi-circular in shape. Labium relatively large. Prothoracic femora distinguishable, narrow. Antennae do not reach ends of mesothoracic legs; ends of metathoracic legs almost concealed. Genae join prothoracic legs and oculi join proboscis at a point only. Mesothoracic legs adjacent to oculi obliquely on rather long length. Thoracic spiracles undistinguished, slit-like. Metanotum has transverse furrow with wrinkles in the centre close to base. Its frontal projections medium obtusely rounded. Abdominal spiracles medium narrow, elliptical and oblique. Abdominal segment 10 merges with cremaster smoothly, without slope on ventral side. Cremaster medium pointed and rounded with regularly domed sides in ventral and dorsal views. In lateral view, the dorsal side domed and the ventral side is almost straight. Cremaster

sculpture is ribbed, robust and almost longitudinal on ventral side, longitudinal in basal and reticular in caudal part of dorsal side. The longitudinal ribbing merges also on dorsal side of segment 10, but does not reach its base. Setae on cremaster slender, D2 much more robust and at least 2 x longer than both D1 and L1, Sd 1 less prominent than others. All setae hooked at ends.

C. oberthuri is distributed in south-eastern Spain in Europe and in Tunisia, Algeria and Morocco in north-western Africa (GOATER *et al.*, 2003). Larva feeds on black poplar (*Populus nigra*).

Catocala eutychea (Treitschke, 1835) (Figs 20-27, 31)

Material examined: Turkey, Alanya, VI-2007, larvae, VIII-2007 3 male and 4 female exuviae, coll. L. Traxler, J. Patočka.

For identification of this species using the key to the species of the genus *Catocala* in PATOČKA & TURČÁNI (2005), refer to couplet #14. Pupa of *C. eutychea* has weakly developed tubercles on the base of ventral side of cremaster (Fig. 27), similar to *C. nymphagoga* (Esper, 1787) and also *C. disjuncta*. This species differs from all smaller species (up to 20 mm in length) of the genus *Catocala* that we investigated based on sculpturing on the dorsal side of abdominal segment 9, which is almost entirely longitudinally ribbed similar to segment 10 and base of the cremaster (Fig. 26).

Description of pupa: 17-20 x 5.5-6 mm, medium stout, red-brown with relatively rich white wax dusting. Sculpture (except of cremaster and dorsal side of last 2 segments) medium fine. Punctuation present on abdominal segment 1-8 but concealed by wax dusting (similar to tiny setae). Labrum has strongly convergent, almost straight sides, and is rounded at the end. Labium rather large, with prothoracic femora concealed. Antennae do not reach ends of mesothoracic legs; ends of metathoracic legs visible. Oculi adjacent to both proboscis and metathoracic legs for short but evident distance. Thoracic spiracles slit-like, clearly elevated structure placed behind them. Metanotum has relatively sharply rounded frontal projections. Abdominal spiracles narrowly elliptical with narrow slits and elliptical courts. Abdominal segment 10 is merged at the base of cremaster by weak slope. Dorsal side of abdominal segments 9-10 longitudinally ribbed. Cremaster lacks conspicuous basal tubercles, is ribbed longitudinally and obliquely on ventral side, with reticular ribbing (except at base) on dorsal side. Setae on cremaster slender, spiral-like, rolled at the end. D2 approximately 2 x longer and more robust than D1, L1 and Sd1.

C. eutychea is distributed in south-eastern Europe (Albania, Bulgaria, Greece, Crete, Turkey) and Levant (GOATER *et al.*, 2003). Larva feeds on *Quercus coccifera* and probably other species of evergreen oaks (GOATER *et al.*, 2003).

Catocala disjuncta (Geyer, 1828) (Figs 11-19)

Material examined: Turkey, Alanya, VI-2007, larvae, VIII-2007 1 male and 1 female exuviae, coll. L. Traxler, J. Patočka.

For identification of this species using the key to the species of the genus *Catocala* in PATOČKA & TURČÁNI (2005), refer to couplet #14. Similar to both *C. nymphagoga* and *C. eutychea*, this species does not have conspicuous tubercles at the base of the ventral side of the cremaster (Fig. 17). It differs from *C. nymphagoga* in that the cremaster is more sharply rounded in ventral view (Fig. 17) and the ends of metathoracic legs are not concealed (Fig. 11). Proboscis adjacent to oculi at point only (Fig. 13), in *C. nymphagoga* proboscis adjacent to oculi for short but conspicuous distance. This species differs from *C. eutychea* in that the dorsal side of abdominal segment 9 is smooth and not ribbed (Fig. 19) and is smaller in size.

Description of pupa: 15-17 x 4-4.5 mm, medium slender, red-brown with white wax dusting. Sculpture, except of cremaster and vicinity, rather fine. Punctuation present on abdominal segments 1-8, fine and relatively shallow, sparse on segment 1, more robust and dense close to base on segments 5-7. Setae are inconspicuous. Labrum almost semi-circular, domed and rounded laterally and caudally. Labium rather large, prothoracic femora concealed; ends of metathoracic legs visible. Antennae slightly shorter than mesothoracic legs. Genae and prothoracic legs, like proboscis and antennae join each other at point only. Border oculi/mesothoracic leg rather long and oblique. Thoracic spiracle indistinguished,

slit-like. Metanotum has medium sharply rounded frontal projections. Abdominal spiracles similar to those in *C. eutychea*. Abdominal segment 10 continuously merges with cremaster on ventral side and is ribbed longitudinally on entire length on dorsal side. Cremaster tapered to the end in ventral and lateral view and not pointed with longitudinal but also transverse ribbing on ventral side, and (except at base) reticular ribbing on dorsal one. Setae on cremaster spiral-like, coiled at the end, slender. D2 slightly longer than D1, L1 and Sd1. Setae L1 and Sd1 are closer to each other than those occurring in *C. eutychea*.

C. disjuncta is distributed from south-eastern Europe across Asia Minor (GOATER *et al.*, 2003). Early stages and biology not described.

Genus *Grammodes* Guenée, 1852

For identification of this genus using the key to the genera of family Noctuidae in PATOČKA & TURČÁNI (2005), refer to couplet #49 which has been modified as follows:

- 49 Setae D2 on cremaster large and robust, bent in crescent shape and obtuse at the end. Additional setae are tiny, D1 positioned far from the base of cremaster. Cremaster has smooth surface. The length of pupa 6-7 mm *Elaphria* Hübner, [1818]
 – Setae D2 on cremaster large and robust, bent in crescent shape and pointed. D1 sit far from the base of cremaster. Cremaster has ribbed surface (Figs 35-37). The length of pupa 16-17 mm *Grammodes* Guenée, 1852
 – Setae on cremaster similar in size and all are generally hooked and/or D1 positioned close to the base of cremaster 50

Pupa medium in size and slender (Fig. 32), their surface without wax dusting. Labrum rounded caudad (Fig. 33). Genae adjacent to prothoracic legs and oculi adjacent to mesothoracic legs for relatively long distances (Fig. 28). Ends of metathoracic legs visible (Fig. 32). Cremaster, abdominal segment 10 (also laterally from anal area) and caudal part of dorsal side of segment 9 with ribbing (Figs 35-37). Setae D2 on cremaster large and robust, pointed, bent in crescent shape. D1, L1 and Sd1 tiny, hooked and concentrated at the end of cremaster (Figs 35-37).

Two species are distributed in Europe and also in central Europe (at extreme south, or as migrants); one was investigated.

Grammodes stolidus (Fabricius, 1775) (Figs 28-30, 32-37)

Material examined: Spain, 1 male exuvia, coll. ZMA Amsterdam.

Description of pupa: 16 x 4.8 mm, purple red-brown, and exuvia brighter. Sculpture medium fine, locally more scabrous, wrinkled bearing tiny and shallower puncturation at segments 1-8. Setae very small. Labrum regularly rounded, almost semicircular. Labium relatively large. Prothoracic femora concealed. Mesothoracic legs join to oculi and ends of metathoracic legs are slightly shorter than antennae. Genae adjacent to prothoracic legs and oculi adjacent to mesothoracic legs for relatively long distances. Thoracic spiracle slit-like and elevated, forming irregular oblong elliptical structure. Frontal projections of metanotum obtusely rounded. Abdominal spiracles elliptical with robust frames and narrow slit. Abdominal segment 10 merges obliquely to base of cremaster on ventral side. Segment 9 longitudinally ribbed on caudal portion on dorsal side, the ribbing merging to segment 10 and to the base of cremaster. Caudal part of cremaster ribbed reticularly. The end of body similarly ribbed also on lateral sides and also on ventral side up to the level of anal field. Cremaster wide in ventral and dorsal views, its sides almost parallel, terminal part obtusangular. Cremaster tapered and obliquely obtuse in lateral view. Setae on cremaster concentrated in its terminal region. Setae D2 occur separately, are large and robust, pointed, and bent. D1, L1 and Sd1 small, thin, hooked.

According to GOATER *et al.* (2003), *G. stolidus* is distributed from Africa eastward through tropical and subtropical Asia to east India, China and Australia, and extending northward into southern

Europe between Portugal and Volga river. Occurs on Mediterranean islands, only occasional migrant to central and north Europe. Larvae are polyphagous feeders on *Rubus*, *Quercus*, *Paliurus*, *Coriaria* and other plants (GOATER *et al.*, 2003).

Genus *Drasteria* Hübner, [1818]

For identification of this genus, represented by the species *D. cailino* using the key to the genera of family Noctuidae in PATOČKA & TURČÁNI (2005), refer to couplet #40 which has been modified as follows:

- 40 Cremaster has 2-4 hooks. Prothoracic femora visible.....42
- Cremaster has 2 divergent spines that are directed obliquely dorsal in lateral view. Pupa 7-8 mm in length.....*Panemeria* Hübner, [1823]
- Cremaster has 2 parallel spines that are directed caudal in lateral view (Figs 44-46). Pupa 18-19 mm in length.....40 a
- Cremaster has 2 small projections which occasionally have setae at the ends.. Pupa 7-10 mm in length.....41
- 40a) Spines on cremaster longer than cremaster itself and are situated far from each other (Figs 44-46) ..
.....*Drasteria* Hübner, [1818]
- Spines on cremaster shorter than cremaster itself and are situated closer to each other.....
.....*Exophyla* Guenée, 1841

Pupa medium in size; slightly tapered and rounded frontad, strongly tapered caudad (Fig. 38). Labrum rounded and strongly convergent caudad. Labium visible, wedge-like (Fig. 39), palpi labiales and prothoracic femora concealed. Prothoracic legs adjacent to genae for longer distance than mesothoracic legs adjacent to oculi (Fig. 38). Cremaster wide and with cavity caudad in ventral and dorsal view, wedge-like in lateral view. In addition to setae D2, tooth-like projections and tiny setae (similar to setae D1 and Sd1) close to its base. Setae D2 long, thorn-like, parallel and located far each of other (Figs 44-46).

This genus is not distributed in central Europe however one species occurs in southern Europe and additional 32 species are distributed throughout the Palaearctic region.

Drasteria cailino (Lefebvre 1827) (Figs 38-46)

Material examined: Turkey, Alanya, VI-2007, larvae, VIII-2007 1 male exuvia, coll. L. Traxler, J. Patočka.

Description of pupa: 19 x 5 mm, cylindrical, tapered caudad only, rounded frontad, and red-brown. It is not wax dusted. Sculpture wrinkled, medium fine. Wrinkles present individually on metanotum, more abundant on abdominal segments 1-8. Setae conspicuous. Labrum has tapered, weakly domed sides and is rounded caudad. Labium long, wedge-shaped, palpi labiales and prothoracic femora concealed. Mesothoracic legs and proboscis almost equal in length; they join tiny ends of metathoracic legs. Antennae distinctly shorter than mesothoracic legs. Genae join prothoracic legs at significantly longer distance than from oculi to mesothoracic legs. Thoracic spiracles slit-like; their caudal margin elevated and dark. Metanotum medium deeply, with arch-like cavity, its frontal projections rounded. Abdominal spiracles narrowly elliptical with robust frames and narrow slit, their plates elliptical. Segment 10 descends weakly to cremaster on ventral side. Cremaster has small tooth-like tubercles on sides, is wider than longer in dorsal and ventral view and with parallel sides, and is deeply cut-out caudad. Cremaster tapers in wedge-like shape in lateral view. Setae D2 long and slender, pointed, situated far from each other on the lobes of cremaster, parallel, and directed caudad. In addition to D2, the base of cremaster bears tiny and fine setae-like setae D1 and Sd1, L2 absent.

According to GOATER *et al.* (2003), *D. cailino* is distributed in southern Europe (Portugal, Spain, south of France, Italy, Sicily, and the Balkan countries). It is recorded also from southern Russia and

Kazakhstan. Outside Europe, it is distributed in Middle East, Asia Minor and Central Asia. Larva feeds on *Salix viminalis*, *Rosa canina* and various shrubs (GOATER *et al.*, 2003).

Discussion

Owlet moths that we investigated from the subfamily Catocalinae, are rather heterogeneous based on their pupal morphology. They do have some similarities: large or medium size; shape of body more tapered caudad than frontad; well developed and usually complete labium; concealed or almost concealed prothoracic femora; and mesothoracic legs adjacent to oculi. Many genera have cremaster ribbed as are segment 10 and eventually 9; smooth transition from segment 10 to cremaster on ventral side; complete number of primitive bristle-like or hook-like setae on cremaster. This primitive shape of the cremaster (with hooks which allow fixing on threads), sometimes together with wax dusting on the body (e.g. in genus *Catocala*), is analogous to some owlets of the subfamily Noctuidae (genera *Enargia* Hübner, [1821]; *Cosmia* Ochsenheimer, 1816; *Ipimorpha* Hübner, [1821]; *Parastichtis* Hübner, [1821]; and others), which have also analogous life cycles. These are generally dendrophilous species which overwinter in the egg stage, with larvae occurring in spring and adults present in early fall. The duration of the pupal stage is short, and pupae rest in webs on the ground or just below the surface; consequently they do not require better insulation and protection provided by rigid soil cocoons (like species of the genus *Cucullia* Schrank, 1802 Noctuidae / Cuculliinae) those species that pupate deeper in the soil and that overwinter as pupae (ie *Lacanobia* Bilberg, 1820, *Orthosia* Ochsenheimer, 1816 both Noctuidae / Noctuinae). Thus, pupation in soil into rigid cocoon increases the importance of supporting prior fixing function of cremaster. The shape of setae on the cremaster is thus differentiated and their number is reduced resulting in clubbed or disc-like enlarged setae D2, polyfunctional setae (e.g. in genus *Lacanobia*), or setae with a predominantly supporting function (e.g. in genus *Orthosia*) (PATOČKA & TURČÁNI, 2005). Analogous development is recorded also in genera of the subfamily Catocalinae, e.g. in the genus *Drasteria* described here, or in genera *Exophyla* Guenée, 1841; *Catephia* Ochsenheimer, 1816 all Erebidae; etc. (PATOČKA & TURČÁNI, 2005).

Differences between individual species in the genus *Catocala* are small based on their pupal morphology. Groups in the genus *Catocala* can be separated on morphological characters such as coloration of adults and larvae, life history, or host plants, however, pupal stages are very similar and differences among them are very subtle. Thus we feel that it is not appropriate to split this genus into several genera or subgenera as proposed by FIBIGER & SKULE (2011) and BECK (2000). Based on our investigations of the morphology of pupa, we also suggest that the genus *Grammodes* (Erebidae, Ophiuini) is closer to the genus *Catocala* (Erebidae, Catocalini) than to the genus *Drasteria* (Erebidae, Melipotini) (FIBIGER & SKULE, 2011).

The genus *Drasteria* probably belongs to another tribe (Synedini) as proposed by BECK (2000).

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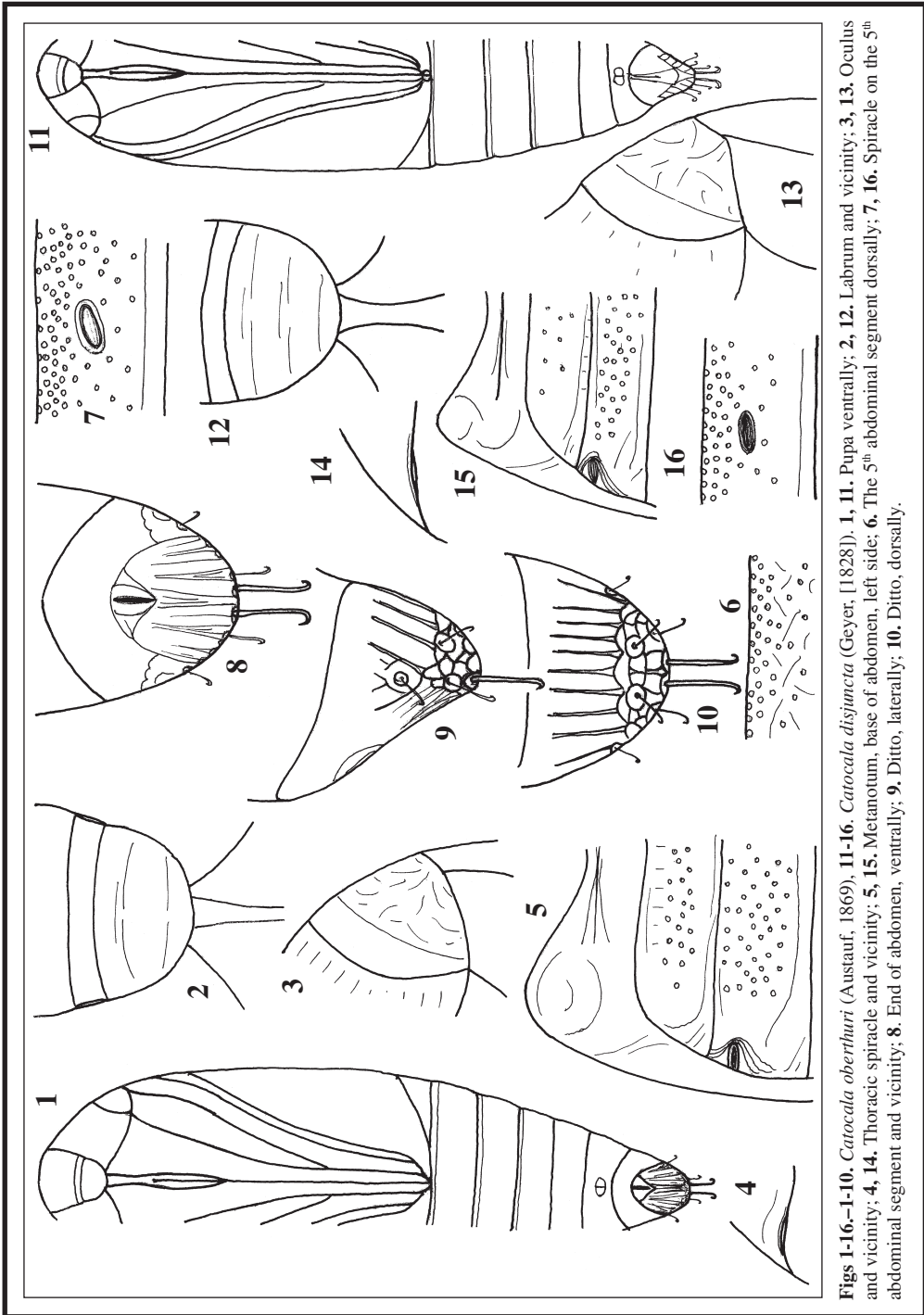
of Agriculture of the Czech Republic QH 71094 “The using of dendrochronology in reconstruction of fluctuation cycles of nun and gypsy moths in central Europe”.

BIBLIOGRAPHY

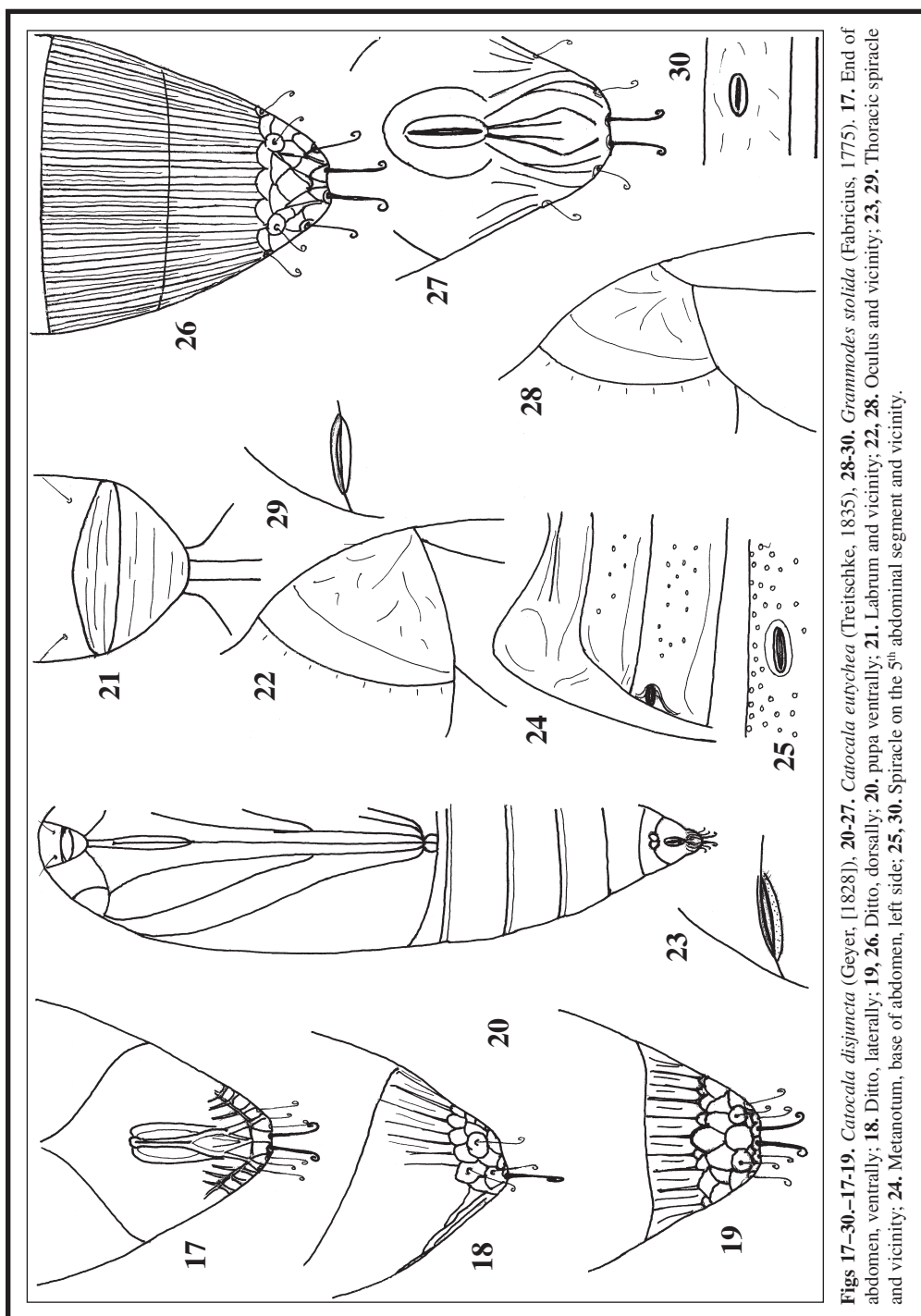
- BECK, H., 2000.– Die Larven der europäischen Noctuidae.– *Herbipoliana*, **3**: 335 pp + 99 pls. Dr. Ulf Eitschberger, Marktleuthen.
- FIBIGER, M. & SKULE, B., 2011.– Fauna Europaea: Erebidae. In O. KARSHOLT & E. J. VAN NIEUKERKEN (eds): *Fauna Europaea: Lepidoptera, Moths*. Fauna Europaea version 2.4, <http://www.faunaeur.org>, (accessed October 14, 2011).
- GOATER, B., RONKAY, L., & FIBIGER, M., 2003.– Catocalinae & Plusiinae.– *Noctuidae Europaeae*, **10**: 452 pp. Entomological Press, Sorø.
- KARSHOLT, O. & RAZOWSKI, J. (eds), 1996.– *The Lepidoptera of Europe. A distributional checklist*: 380 pp. Apollo Books, Stenstrup.
- PATOČKA, J., 1995.– Die Puppen der mitteleuropäischen Eulen: Unterfamilien Herminiinae, Rivulinae, Hypeninae und Catocalinae (Lepidoptera, Noctuidae).– *Entomofauna*, **16**: 317-368.
- PATOČKA, J. & TURČÁNI, M., 2005.– *Lepidoptera Pupae, Central European Species*: 542 pp. (Text) + 321 pp. (plates). Apollo-Books, Stenstrup.

M. T.
Czech University of Life Sciences
Kamýcká 1176
CZ-165 21 Praha fld. - Suchdol
REPÚBLICA CHECA / CZECH REPUBLIC
E-mail: turcani@fld.czu.cz

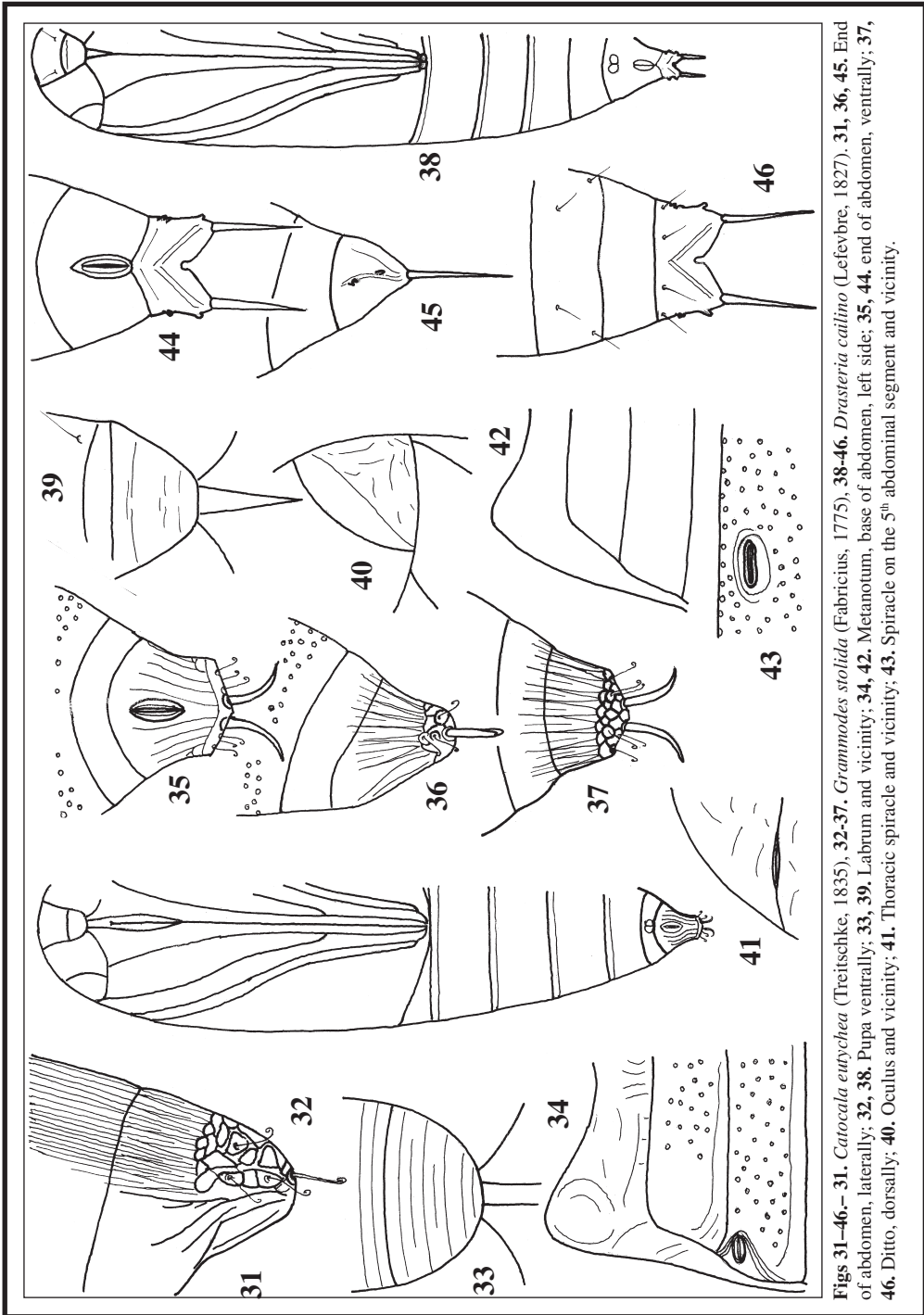
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Figs 1-16. *Catocala oboethuri* (Austauf, 1869), 11-16. *Catocala disjuncta* (Geyer, [1828]). 1, 11. Pupa ventrally; 2, 12. Labrum and vicinity; 3, 13. Oculus and vicinity; 4, 14. Thoracic spiracle and vicinity; 5, 15. Metanotum, base of abdomen, left side; 6. The 5th abdominal segment dorsally; 7, 16. Spiracle on the 5th abdominal segment and vicinity; 8. End of abdomen, ventrally; 9. Ditto, dorsally; 10. Ditto, laterally.



Figs 17–30. 17–19, *Catocala disjuncta* (Geyer, [1828]), 20–27, *Catocala eutychea* (Treitschke, 1835), 28–30, *Grammodes stolidus* (Fabricius, 1775). 17, End of abdomen, ventrally; 18, 26, *Catocala disjuncta*, pupa ventrally; 19, 26, *Catocala disjuncta*, pupa ventrally; 20, pupa dorsally; 21, Labrum and vicinity; 22, 28, Thoracic spiracle and vicinity; 24, Metanotum, base of abdomen, left side; 25, 30, Spiracle on the 5th abdominal segment and vicinity.



Figs 31–46. – 31. *Catocala eurypthea* (Treitschke, 1835), 32–37. *Grammodes stolidia* (Fabricius, 1775), 38–46. *Drasteria calino* (Lefebvre, 1827), 31, 36, 45. End of abdomen, laterally; 32, 38. Pupa ventrally; 33, 39. Labrum and vicinity; 34, 42. Metanotum, base of abdomen, left side; 35, 44. End of abdomen, ventrally; 37, 46. Ditto, dorsally; 40. Oculus and vicinity; 41. Thoracic spiracle and vicinity; 43. Spiracle on the 5th abdominal segment and vicinity.